

Executive Summary

In response to a congressional mandate, this report examines the safety challenges arising from the operation of longer freight trains, and particularly from the increased use of longer manifest trains that transport a mix of freight in many different types of rail cars. The report also examines the impacts of increasing freight train length on the frequency and duration of blocked highway-rail grade crossings and the scheduling and efficient operations of Amtrak intercity passenger trains. The following is a summary of the report's key findings and assessments for each of these three impact areas, followed by a note on other potential impacts. Recommendations are offered on actions to address impacts that would benefit the most from policy interventions.

LONGER MANIFEST TRAINS CAN CREATE NEW AND HEIGHTENED SAFETY RISKS REQUIRING ACTIVE CONTROL

As the length of a manifest train increases, safe handling can be more challenging to manage relative to the handling of a shorter manifest train or a unit train (a train consisting of the same general car types) of comparable length. As a general matter, manifest trains create operational challenges due to the mixture of rail car types, designs, sizes, and weights. All rail cars in a train are subject to longitudinal forces that create draft and buff load conditions and to lateral forces, especially at curves. These in-train forces can lead to broken equipment, including drawbars and couplers, and cause the wheels of a car to leave the rail when negotiating curves. The magnitude of these forces will differ among cars that vary in size and weight, and

the movement and mitigation of the forces will differ among cars having different drawbars and coupling devices with or without cushioning units.

Railroads must therefore pay close attention during the makeup of manifest trains to the placement of cars of different types, designs, sizes, and weights to manage in-train forces, reduce risks of derailment, and preserve train integrity. In particular, they must make choices about the placement of light cars, short cars, heavy cars, and cars with and without cushioning devices to facilitate safe handling as well as efficient operations. They must also pay attention to the placement of locomotives for distributed power (DP), as these units help control in-train forces through adjustments to power and activation of brakes, or they can add to the operational challenge if poorly positioned.

As the length of a manifest train increases, so too will the complexity of accounting for these in-train forces through train makeup decisions. Longer trains have more cars, possibly a greater variety of car types and sizes, and more requirements for power distributed across the train compared to shorter manifest trains. Moreover, the rail cars in a long train can be experiencing a wider range of grade and curvature conditions as the train spans more terrain. As a practical matter too, long trains can create more challenges for proper train makeup because they are so long and are constructed from blocks of rail cars that are switched to and from other trains and yards enroute. The placement of these blocks requires planning and can take time to execute. While assembling short trains also takes planning and time, assembling long trains can present additional challenges and opportunities for errors in car placement due to limited yard space, insufficient track lengths, and added demands on labor.

Train makeup decisions and train length must be made with ample consideration of the capabilities and performance of the crews that operate the trains. To this end, railroads have introduced engineer-assist systems to control trains by calculating the best operating profile for both lead and DP locomotives, while considering factors such as the route's grade and curvature and the train's length, weight, and composition. The availability of these engineer-assist systems, however, does not reduce the importance of crew readiness and performance in managing the handling requirements of long manifest trains in the varied environments and territories in which they are being used. Yardmasters and dispatchers must also account for these handling challenges when constructing and routing trains.

The operational demands of long manifest trains, therefore, require a combination of responses by railroads that includes well-designed and consistently applied train makeup rules, the deployment of appropriate technology (e.g., DP units, brakes, engineer-assist programs), and assurance of crew readiness and competency. To assess railroad claims about the effectiveness of these responses, the committee examined Federal Railroad

Administration (FRA) accident records, which contain causal information that can be used to observe trends in derailments from the kinds of train handling and equipment issues characteristic of in-train forces not being adequately controlled. Having observed an increase in the rate of occurrence of these types of derailments, the committee asked the Class I railroads, through the Association of American Railroads (AAR), to provide data on their train operations with sufficient detail to ascertain train type and length for the purpose of more granular assessments of the derailment records. However, restrictive conditions on the data's availability and use, including a high degree of data aggregation and preapproval of the analytic methods to be used, foreclosed this option. Nevertheless, a review of publicly available data on train traffic indicates that the average length of manifest trains has been increasing coincidental with an increase in the rate of derailments of interest. Absent more detailed data, the committee was not able to verify that the operational demands created by longer manifest trains are being fully controlled, and indeed the limited analyses that could be performed suggest that more targeted safety assurance measures may be needed.

The report also documents the committee's consultations with national labor union representatives and railroad employees, who raised concerns about the amount and quality of training they receive for safely handling long manifest trains and about the challenges they face assembling the trains correctly. Concerns included the problems crew members can face maintaining communications with one another while maneuvering long trains at yards and during train inspections and repairs, which take more time to perform as train length increases. The potential for error from crew member miscommunication and fatigue was also raised as a concern when the time required to walk the train increases.

These heightened operational challenges and risks arising from increasing the length of manifest trains need to be recognized and addressed in a deliberate and systematic manner. Following direction from Congress for railroads to put in place safety management systems for the purpose of controlling risks deliberately and systematically, FRA required each Class I railroad to develop and implement Risk Reduction Programs (RRPs). However, the RRP rule was written to allow streamlined safety management systems that do not obligate railroads to anticipate and account for risks arising from all major planned operational changes, including the expanded use of longer manifest trains. To rectify this problematic shortcoming in the RRP rule, and to ensure that railroads are indeed being proactive in their treatment of the risks from longer trains, the committee recommends the following.

Recommendation 1: The Federal Railroad Administration should revise the Risk Reduction Program (RRP) rule to require railroads to address

all major operational changes in their RRP in an explicit and comprehensive manner. Current RRP requirements do not obligate railroads to address planned operational changes that can affect safety. To the contrary, railroads should be required—consistent with the principles of safety management systems—to identify and analyze the risks associated with all planned significant operational changes and to explain and justify the procedural, technological, and human-systems means that will be used to eliminate or reduce the risks.

Recommendation 1a: The revisions to the Risk Reduction Program (RRP) rule should be written in such a way as to make it clear to railroads that an operational change that is known to increase and add new train integrity and handling challenges, as lengthening manifest trains can do, constitutes an operational change that should be addressed in an RRP. Compliant railroads should be expected to have an RRP that is thorough in describing any operational and handling challenges, assessing their safety risks, explaining how the risks will be managed through procedural and technological means, and describing how those risk reduction means will be monitored and assessed for effectiveness.

Recommendation 1b: The Federal Railroad Administration (FRA) should seek from Congress the resources required to hire and train a team of auditors skilled in reviewing safety management systems to regularly and critically assess the completeness and quality of each railroad's Risk Reduction Program (RRP) and its key components. The auditors in turn should enlist FRA inspectors to verify that a railroad's risk reduction measures are implemented in the field. For trains whose length creates new and increased operational and handling challenges, the FRA auditors and safety inspectors should expect to find that compliant railroads, at a minimum, have

- Train makeup rules and procedures for implementing them that are well justified and informed by best practices applicable to train types and a range of operating conditions and terrains encountered.
- Descriptions of the technologies to be deployed to control operational risks, including the use of distributed power, engineer-assist programs, and braking systems, and explanations of how their effectiveness will be monitored and evaluated.
- Assessments of the skills and competencies needed by crew members to perform safely when encountering the operational and handling challenges and how these needs will be met through crew training programs and other means.

- Explanations of any other challenges that added train length can create and that could have a bearing on safety, such as from the added work and complexity of train assembly and disassembly, added inspection times, and maintaining crew radio communications. Measures to address these safety-related challenges should be described and justified.

Recommendation 1c: To aid railroads in the development of increasingly effective measures for reducing risks associated with long trains and to aid auditors in obtaining the requisite knowledge for critically assessing a railroad's risk reduction measures and their justifications, the Federal Railroad Administration should survey and synthesize industry protocols and best practices on train makeup, crew training, and communications capabilities pertinent to addressing the operational and handling challenges arising from increases in train length under different operating and environmental conditions.

The evidence in this report about the added challenges that train crews face when operating and handling manifest trains as they increase in length, including difficulties maintaining radio communications while inspecting and riding equipment, suggests that the time is right for FRA to also take a closer look at the coverage and adequacy of the regulations, FRA standards, industry guidance, and railroad operating procedures and practices for crew training and radio communications. With these interests in mind, the committee recommends the following.

Recommendation 2: The Federal Railroad Administration should stand up separate working groups under the Railroad Safety Advisory Committee that are tasked with evaluating and providing advice on the following:

- 2a. Methods and technologies that can be implemented to improve the capabilities, competencies, and training that train crews and other railroad employees require for the safe operation, assembly, and inspection of trains as they become longer; and
- 2b. Technological means and performance standards for ensuring that train crew members have the capability to communicate, including while inspecting and riding equipment, in a manner that can be continuously maintained and does not create personal safety hazards.

COMMUNITIES EXPERIENCING CHRONIC BLOCKED HIGHWAY-RAIL GRADE CROSSINGS NEED REAL SOLUTIONS

Trains frequently block pedestrian and motor vehicle traffic as they travel through, and sometimes stand idle in, highway-rail grade crossings. To the extent that the trend toward longer freight trains leads to fewer trains in the aggregate, one would expect potentially fewer blocked crossings. However, a transiting longer train will block a single crossing for a longer period than a shorter train and is more likely to block multiple crossings at the same time. Train transit times through crossings may be slowed further by speed restrictions that all freight trains must abide by but that will impact long trains over a greater distance and for a longer time. It is not clear whether a long train is more likely than a short train to be stationary on a grade crossing for a longer period; however, when trains are being assembled and disassembled in rail yards, longer trains, due to their length, are more likely to exceed the capacity of rail yards built for shorter trains operated in the past and therefore spill out from yards to block grade crossings in the vicinity of the facility.

Apart from the logical inference that a long train will take more time than a short train to transit a grade crossing simply because of its added length, the evidence to suggest that long trains block grade crossings more often, whether idle or moving, is largely anecdotal. The committee heard from leaders of communities impacted by chronic grade-crossing blockages who maintain that train length is a factor in both the frequency and duration of blockages. Some of the communities are in proximity to rail yards where trains frequently stand idle for long periods awaiting entry to the yard and where train assembly and disassembly operations can lead to trains moving back and forth over one or more crossings multiple times. The community leaders complained about the resulting increased response time for emergency responders and the lengthy and recurrent delays incurred by motorists and pedestrians. Examples of interrupted access to neighborhoods, schools, and recreational facilities were given along with instances where impeded pedestrians, including students, maneuvered through stopped trains at considerable personal risk. Such problems are also reported on a regular basis by the media and in a database maintained by FRA for the public to report blocked crossings.

While state and local laws once gave communities leverage with railroads in seeking remedies to chronic blocked crossings, federal preemption, upheld in the courts based on the Constitution's interstate commerce clause, has eliminated this leverage. Today, there are no federal laws or regulations pertaining to blocked crossings to replace the vacated state and local laws. Accordingly, FRA and the Federal Highway Administration, as well as state and local jurisdictions, do not possess direct means to compel railroads

to limit the frequency and duration of blocked crossings. State and local governments can make public investments in grade separations, sometimes with federal aid, or they can choose to close some low-volume crossings to motor vehicle and pedestrian traffic. However, both options can be expensive to the public and/or disruptive such that they are not applicable to many instances where blocked crossings are problematic.

The absence of network-level data from grade-crossing monitoring systems and reliance on anecdotal reports makes it difficult to assess trends in blocked crossings, including impacts from long trains. Inasmuch as frequent and lengthy blocked crossings are a general concern of railroad operations, such monitoring and data gathering would be valuable for finding solutions to blockages that are especially problematic. In short, the committee cannot confirm whether a trend toward long trains is positively or negatively impacting the frequency and duration of blocked grade crossings. However, what is clear is that operating long trains is not necessarily a solution for resolving chronic blocked crossings and may be making the problem worse in some locations. For this reason, the committee recommends the following:

Recommendation 3: Congress should authorize and direct the Federal Railroad Administration to obtain data on an ongoing basis from railroads on blocked highway-rail grade crossings. The railroads should be obligated to deploy automated means for efficiently collecting and reporting the data on a regular and expeditious basis. Data collection should focus first on crossings with gates and other active warning devices that are indicative of higher traffic locations where blockages are likely to be the most disruptive; then data collection should expand to more public highway-rail grade crossings. Individual blockage incidents that exceed defined thresholds of duration should be prioritized for reporting, such as when a crossing is occupied for more than 10 minutes.

Recommendation 3a: The Federal Railroad Administration (FRA) should use these grade-crossing reports to gain a better understanding of the incidence, magnitude, and scope of the blockage problem. For this purpose, FRA should make the reports available to states and their transportation agencies, regional and metropolitan planning organizations, local communities, and the public through means such as portals and other self-service data retrieval tools. FRA should seek from these stakeholders contextual information about problem sites experiencing frequent and lengthy blockages such as by requesting data on the affected roadway's traffic volumes, emergency response activity, and significance for accessing neighborhoods, schools, hospitals, and other essential facilities and services during times when crossings were blocked.

Recommendation 3b: Informed by the reports of blockages, the Federal Railroad Administration should negotiate with the railroads individually and collectively to find solutions to the most problematic blockage sites, reduce the incidence and severity of the problem generally, and determine whether the trend toward increasing train length is creating special problems such as more blocked crossings near rail yards that require targeted remedies.

Recommendation 3c: Congress should give the Federal Railroad Administration authority to impose financial penalties on railroads for problematic blocked crossings. The penalties should be sufficient in magnitude to prompt good faith negotiations to resolve problematic crossing blockages.

FREIGHT RAILROADS SHOULD BE DETERRED FROM USING LONG TRAINS WHERE THEY WILL IMPEDE AMTRAK TRAINS

The report considers the impacts of longer freight trains on the passenger trains operated by Amtrak. Many of Amtrak's intercity passenger trains operate over the track of other railroads (called "host railroads") that were relieved of their common carrier obligation to provide passenger service when Amtrak was created. Federal statute grants Amtrak trains preference over a host railroad's trains, and thus if operational conflicts arise due to the increasing length of freight trains, this can be a clear public policy matter.

Amtrak maintains and has marshaled evidence that it incurs lengthy service delays when its passenger trains meet or follow freight trains that are too long to pass using available sidings on mainline single-track route segments. A host railroad that is aware of a mismatch between the length of freight trains being operated and the infrastructure available on the route to accommodate the passenger trains operated by Amtrak would seem to conflict with the latter's statutory right to run ahead of freight trains. To address this problem, the committee recommends the following.

Recommendation 4: Congress should direct and empower the Federal Railroad Administration (FRA) to enforce the performance of host freight railroads in giving preference to Amtrak passenger trains on single-track route segments where there is a mismatch between the length of freight trains being operated and the infrastructure available on the route segment to accommodate them without delaying Amtrak trains. Under these circumstances, when an Amtrak train experiences delays because of an inability to meet or pass a freight train, the host railroad should be subject to financial penalties. The penalties should be substantial and certain enough to deter this practice and to

motivate solutions, including the rightsizing of freight trains to sidings and investments by host railroads in longer sidings. This FRA function would need to be allied with the Surface Transportation Board's jurisdiction over railroad practices and service.

Finally, the report considers, but does not make policy recommendations about, certain impacts from longer trains, including their effects on greenhouse gas (GHG) emissions and the operational fluidity of freight trains. GHG emissions are a major public policy concern, but on a national scale freight trains are not intense emitters of these pollutants. Estimating the marginal emissions impacts from longer trains would require many uncertain assumptions about whether and by how much longer freight trains are replacing shorter trains or diverting freight to or from trucks and other modes. With regard to freight train operational fluidity, some of the operational impacts from using longer trains are described, such as on rail car cycle times; however, the railroads must account directly for the choices they make about when and how to use long trains, including impacts on their paying customers.